Separation of ammonium from industrial wastewater containing methanol by copper hexacyanoferrate (CuHCF) electrodes

Copper hexacyanoferrate (CuHCF) electrodes is of great interest in the past decades as an alternative electrocatalytic material due to its high versatility. This work evaluates the performance of CuHCF electrode for removal of ammonium from industrial wastewater. Appropriate insertion and desertion potentials (0.3 and 1.1 V vs. Ag/AgCl) are used for the first test, and a long-term stability test. The insertion capacity of the CuHCF was 175 mg NH_4^+/g CuHCF from the test of the synthetic stream (56 mM NH_4^+), which corresponds to power consumption 1.3 x 10^{-3} kWh/gNH_4^+. For real industrial wastewater with the same concentration, the insertion capacity was 168 mg NH_4^+/g CuHCF and 1.4 x 10^{-3} kWh/gNH_4^+ with respect to power consumption. The electrode slurry was modified by adding carboxymethylcellulose sodium salt, which maintained the stability of the electrode from open circuit potential and cyclic voltammetry programs were 61.2 and 50 h, respectively. The durability of the electrode under the chronoamperometry program was 28 and 24 h in a synthetic and real industrial stream, respectively. Overall, this study highlights the potential of low-cost CuHCF electrode with long-term stability and durability for achieving ammonium removal from industrial wastewater.